CASE HISTORY – TACOMA MINE EXPLOSIVES[1]

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ABSTRACT

A biologist finds an underground powder magazine with sweaty sticks of dynamite while conducting a survey for bat use of underground mines. The mine is in a remote area, but accessible by a 4WD road. It is now late September and a large number of Townsend's big-eared bats are hibernating in the mine. The biologist calls you at the Abandoned Mine Reclamation Program. What do you do?

Explosives have been used in mining throughout the nation and the world. This event happened in the western U.S., although similar events could, and have happened wherever mining has taken place. Laws, policies, and procedures involved in documenting the discovery and disposal of these explosives are described as a reference for dealing with explosive materials in other abandoned mines. Changes in explosive regulations since the 9/11/2001 destruction of the World Trade Center are briefly described.

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Introduction

A biologist finds an underground powder magazine with old sweaty sticks of dynamite while conducting a survey for bat use of underground mines. The mine is in a remote area, but accessible by a 4 wheel-drive road. It is uncertain whether the mine is in the state of Utah or Nevada because it is so close to the border. The powder magazine is a small room off the main adit accessing the bat survey area of interest. The biologist has been conducting underground surveys of the bat population on almost a monthly basis during the past six months. It is now late September. A large number of Townsend's big-eared bats are in the mine and beginning to go into torpor (their hibernation phase). The biologist calls you at the Abandoned Mine Reclamation Program with the information. What do you do?

Explosives have been used in mining throughout the nation, and the world. This case history describes the discovery and disposal of unstable explosives in a mine opening in the western United States, although this event could, and has happened anywhere mining has taken place. In addition to describing this event, the laws, policies, and procedures involved in documenting the discovery and disposal of abandoned explosives are discussed as they related to this particular case as a reference for those agencies or individuals who end up dealing with explosive materials in abandoned mines.

Utah Program Encounters With Explosives

Since the creation of the Utah Abandoned Miner Reclamation Program (UAMRP) in 1983 there have been eight documented encounters of explosive or potentially explosive materials while working on abandoned mine projects. This does not include those times when a third party discovers explosives in a mine and contacts the UAMRP for guidance. There are only five such occurrences on record, but not all third party contacts have been recorded, so the actual amount may easily be double that number. Eight encounters over 23 years do not seem significant, but the potential for injury with just one wrong encounter makes this subject very important. There have been no accidents or injuries to a UAMRP staff member, or construction worker from explosive materials thus far in the history of the UAMRP, and we intend to maintain this record.

A summarized list of the UAMRP Projects where explosives have been encountered, the type of explosive materials found, and their disposition is presented below in chronological order:

Blackhawk Project

Approximately 11 cases or about 600 pounds of old, deteriorating dynamite were found by a UAMRP project manager inside a locked powder magazine during closure construction in November of 1996. The large amount of explosives required some extraordinary measures before attempting any disposal actions. The magazine was set into the hillside. A trench was excavated parallel to a gas pipeline to absorb the shock from a possible detonation at the

magazine about 210 feet away. A berm of soil approximately ten feet high was constructed around the three exposed sides of the magazine to also absorb or deflect the effects of a detonation. Traffic was stopped on several roads in the area. A helicopter was used to clear the surrounding area of hunters or other persons prior to the disposal action. The Tooele Army Depot Explosive Ordinance Disposal (EOD) Team, Highway Patrol Hazardous Materals Team, and an Explosives Expert from Bradley Safety Consultants, burned these materials on site without detonation ten days after the discovery.

Silver Reef Project

The contractor opened a locked metal powder magazine during construction of mine closures in January of 1997. The magazine contained nine 50-pound bags of sensitized prill, and 15 tubes of NitroPak (blasting initiator). The magazine was readily accessible off a maintained dirt road. The beginnings of an upscale housing development were located within several thousand feet of the magazine. The Tooele Army Depot EOD removed the NitroPak from the magazine and burned those materials onsite. The magazine was flooded with water to neutralize the sensitized prill in place. This disposal took place 13 days after the discovery.

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Paiute Trail Project Inventory

A crew under contract with the UAMRP was inventorying abandoned mines in October of 1997 when they discovered blasting caps, blasting wire, safety fuse, prills, and a five-gallon bucket of Texaco products. The contractor notified the UAMRP and the sheriff. The sheriff disposed of the materials without further UAMRP involvement.

Yellow Cat Project

The construction crew found a ripped bag of ammonium nitrate prill inside a mine portal in October of 2002. The incident was reported and a BLM staff member was to investigate and/or remove the materials. The adit was easily accessible by an old mine road passable by high clearance vehicles. Construction of the closure for that opening was postponed. An unknown party removed the prill from the site while construction was taking place at other sites.

During the course of this construction project a criminal stole a highway patrol cruiser and left the freeway in an attempt to escape on the maze of dirt roads in the project area. The car became stuck in sand and the criminal tried to escape on foot. The barricade of highway patrol cars and heavily armed officers blocking the road out of the project area made for few tense moments – after working in the desert all day we all probably looked like suspects. Our project map showing the dirt roads in the project area was helpful in showing the authorities where the cruiser and criminal were last seen.

Temple Mountain Project

During closure construction a half-full box of blasting caps was found in a shallow underground room in April of 2002. A construction worker was working on a hand backfill at the opening and found the box. The box was stashed in a safe location until the hazardous

materials authorities could be notified. The Tooele Army Depot EOD disposed of these caps within 21 days after the discovery.

Several days later during closure construction at another opening the construction crew found a partially buried stick of dynamite with fuse and some loose blasting caps inside an adit on a small ledge. The site was flagged and the proper authorities notified. When the crews returned after the weekend they found some equipment had been vandalized and the dynamite and caps were missing. The Tooele Army Depot Explosive Ordinance Device (EOD) destroyed the loose blasting caps on April 23.

Circle Cliffs Project

The UAMRP staff was doing a field check of inventory data in June of 2003 and investigated an adit reported to have a stick of dynamite in a drill hole in the wall. They found the drill hole and found another drill hole on the mine floor with a piece of detonating cord coming out. The Tooele Army Depot EOD was notified. They investigated the site and found only one stick of dynamite and several lengths of detonation cord. They destroyed these materials using five pounds of C-4 explosives six days after the UAMRP examined the site.

San Rafael Inventory

A nearly full cardboard box of dynamite and several blasting caps were found in a mine adit by UAMRP staff during inventory in May of 2004. The adit is about 1,000 feet higher and slightly more than one mile up canyon from a popular trailhead described in several guidebooks. The elevation and location prevent the adit from being visible from the trailhead. The mine opening was spotted during a hike to inventory other openings in the area, so the first visit to the site involved a difficult and indirect route. It was later discovered that an ATV could travel within a half-mile of the opening using an old mine road leading to the adit. The adit was located on an active mining claim, but the operator did not possess the legal qualifications to remove or dispose of the explosives. The County Sheriff and an explosives expert burned this material on site 57 days after the material was first discovered.

Brown's Hole Inventory

A suspect cardboard box labeled as "High Explosives" and an empty box of safety fuse were found in a shallow adit during inventory by UAMRP staff in October of 2005. The high explosives box was firmly imbedded in the mine floor and the contents were not easily examined. The adit was in a narrow canyon about 15 feet above the bottom of the drainage and accessible by foot only. The adit was located on a State owned section. The box turned out to be empty, but the disposal inspection revealed a live blasting cap found in the dust and debris on the mine floor near the box. This material was burned on site by the Grand County Sheriff's department 13 days after the material was first discovered.

What is Your Protocol for Explosives at Abandoned Mines?

The UAMRP encounters with explosives happened during inventory of abandoned mine openings or during construction of mine closures. During inventory the discovery is usually made by a staff member or by a hired consultant. Both persons should have some general mine opening safety and explosive recognition training. It may not be common practice to screen consultants on the basis of hazard recognition and/or explosives training, but this issue should be discussed when hiring someone for abandoned mine inventory.

During construction the discovery is usually made when a worker starts on a mine closure. The subject of what to do if explosives are found should be discussed at a general safety meeting with the construction contractor and crew at the beginning of any abandoned mine construction project.

These encounters and the extremely hazardous nature of such a discovery prompted the UAMRP to prepare a protocol to follow when explosive materials are discovered. A copy of this draft Explosives Protocol is available upon request. This protocol first provides definitions and descriptions of explosive materials commonly found at mine sites. These definitions describe the materials and their potential for detonation. The explosive materials may include: blasting caps, detonating cord, safety fuse, ammonium nitrate (sensitized or unsensitized)/diesel fuel (ANFO), black powder, dynamite, nitroglycerin, plastic explosives, and undetonated military ordinance. Other potential explosive materials that may be found include: carbide, fuels, unknown liquids in unmarked containers, and welding tanks.

Under this protocol, all explosives and containers of unknown contents are to be considered hazardous and unstable until proven otherwise. The major tenets of this protocol are to leave any suspect explosive materials in place, collect as much descriptive information as safely possible to document the discovery, and then contact the appropriate authorities, supervisors, and explosive experts.

To assist in collecting the appropriate information the protocol has a checklist to go through. First, estimate the volume of explosives. Describe the location of the explosives, such as in a magazine, day box, portal, mine face, dugout, building or open area. Record the distance and direction from the explosives to residences, buildings, roads, public utilities, and flammable materials. For confined explosives, describe the probable direction of the primary blast force. If a powder magazine is involved, describe the dimensions and construction materials for the magazine. Describe the type of packaging for the explosives and the condition of that packaging. Record any labels, brand names, contents, weights, dates or codes on the packaging. Provide information regarding the apparent source of explosive materials, such as mining, abandonment, illegal operations (midnight dumping, drug labs, etc.), or recreation activities (stove fuel, gasoline, oil). If possible, secure the site before leaving the area.

In addition to recording information describing the suspect materials, you should make a good record of the access route and distance to the site. Include a description of visual landmarks along the route and near the opening. Include GPS coordinates and the datum used for these coordinates. Reference and attach the appropriate USGS 7.5-minute quadrangle map. Include photographs of the materials and mine opening if available.

After safely documenting the suspect materials there comes the responsibility and notification tasks. The order of notification may differ for each organization. What is the proper order of notification for your organization? Who do you notify first? The sheriff then land managing agency? Do you need to notify other federal or state agencies such as the Bureau of Alcohol, Tobacco and Firearms (ATF) or the State Department of Hazardous Materials?

The protocol checklist includes listing any notifications you have made, such as the Program Administrator, the local law enforcement, the land managing agency, a military EOD crew, or other emergency services. Most agency policies will follow the same safety aspect of this protocol, however, the documentation requirements, or the order of procedural steps and notifications may vary.

Each Situation Will Have Unique Issues

Who is responsible for the disposition of explosive materials at an abandoned mine? Is there a claimant on record? Who is the land managing agency? What is their policy/protocol for this situation? Who has to be notified? Who can dispose of the explosives legally?

Some of these questions can be answered by doing advance preparation and discussing abandoned explosives with the land managing agencies and state agencies beforehand. Ask the appropriate field offices of the Bureau of Land Management (BLM) and United States Forest Service (USFS) for their notification protocol for explosives. Ask if they have an explosives disposal expert or team. Contact the state agencies that have the potential for involvement with abandoned explosives, or their disposition. Some of the questions cannot be answered until you know the unique details for each situation.

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Each Agency May Have a Different Protocol

The Biologist

The Utah Division of Wildlife Resources (DWR) biologist doing the surveys for bats did not have an underground safety protocol prior to contacting the UAMRP. Prior to this, they formed an impression of the general safety of entering the Tacoma mine based on the amount of visitation signs they had seen during their surveys. The logic was something like if a large number of people are entering the mine and leaving the mine, then the opening must be fairly safe. The biologists do not normally seek out abandoned mine openings for biological study.

After contacting the UAMRP, reviewing the safety protocol for underground surveys and going underground with a biologist experienced in underground surveys, the DWR biologist decided to make some changes to their survey practice. They now notify the sheriff or a field office of their planned date and time of underground surveys, along with UTM coordinates and a timeframe for an “all clear” call at the end of their surveys. They will often have a safety officer remain outside of the mine in case of an accident or failure of the survey crew to return to the surface.

The DWR biologist did not have a specific protocol to follow when encountering explosive materials. Their general duties do not present such situations on a regular basis. They had no such hazard recognition training. The Tacoma mine encounter provided them with a new set of safety guidelines when encountering explosive materials.

The Sheriff

The Box Elder County Sheriff's general protocol when encountering explosives is to first notify their superior. They file a report documenting the discovery, the location and any actions taken. Based on the perceived risk they may take immediate action to dispose of the materials or wait. The Box Elder Sheriff's office does not have an explosives expert on staff, so they contact another sheriff's office or request assistance from the closest explosives expert, which in this case is at the Hill Air Force Base.

Land Status May Complicate Matters

Patented Claim

Patented mining claims are considered private property. The owner has title to the locatable minerals and the surface. It is unlawful for a person to enter upon a patented mining claim that has been posted with no trespassing signs. Only those parties with police powers are allowed to access patented claims without permission. In the state of Utah, the UAMRP has police powers to enter a patented mining claim for the purpose of evaluating potentially hazardous mine openings.

If explosive materials are found on a patented mining claim, the current owner may be responsible for the removal or destruction of the explosives. The patented claim owner may have some responsibility for maintaining safety at the mine openings under state mining regulations or under general laws as a landowner. The owner may bear some financial responsibility for the disposal of explosives found on their claim.

The situation can become more complex if the patented claim has multiple owners, which is not uncommon. There may be one owner who acts on behalf of the majority shareowners, or you may have to contact a number of owners to have a majority consensus for a decision.

Example – Tacoma Mine Patented Claim. The Tacoma Mine opening was located on a patented claim. Claimant information from the County Recorder's office was used to identify the owner of record. The DWR staff attempted to contact the claimant by mail and telephone. None of these attempts were successful. The owner may have moved to a new address that was not recorded, or the owner may be deceased. It is not uncommon for a mining claim to be passed on to unknowing family members through a will.

Unpatented Claim – Inactive Mine

Unpatented claims are subject to the BLM regulations. Claimants with mine openings on unpatented claims may be responsible for maintaining those openings in a safe condition. An unpatented claim may not have any active mining taking place so they may not have a mining notice filed with the BLM. In this case the claim would not be subject to the BLM regulations for active mine operations. When considering closure of this type of opening by an abandoned mine program the BLM may offer the claimant these options: (1) accept responsibility for securing the mine opening by filing a notice and posting a bond for the site, or (2) the BLM will allow the hazardous mine opening to be closed by the abandoned mine program. In Utah an unpatented claim without mining activity would not be considered subject to the State Mineral Mine Regulations.

Unpatented Claim – Active Mine

A mine may have a valid claim and an active plan or notice on file with the BLM or State and still appear abandoned. An unpatented claim with active mine operations could be subject to both the BLM and State mining regulations. Claims on USFS land would be subject to USFS regulations and possibly State mining regulations. A mine opening within the area of an active mine permit would not be eligible for closure by the UAMRP.

Homeland Security – Since 9/11/01

After the September 11, 2001 attack on the Twin Towers the United States Government made a number of changes to improve homeland security. Some of those changes were made to the regulations regarding the handling of explosives. On November 25, 2002, President Bush signed the "Homeland Security Act of 2002." Contained within that Act was Subtitle C, Title XI, "The Safe Explosives Act," or SEA (SEA, 2002).

A fact sheet provided by the ATF (ATF 2002) states the SEA legislation takes effect in two parts. Two SEA provisions are effective 60 days after enactment, and three provisions are effective 180 days after enactment.

In one of the first two provisions the SEA adds three new categories of persons prohibited from receiving or possessing explosives to the previous four categories. The three new categories of prohibited persons are (1) aliens (with limited exceptions), (2) persons who have been dishonorably discharged from the military, and (3) citizens of the United States who have renounced their citizenship. These were added to the four pre-existing categories of prohibited persons.

The second of the first two SEA provisions requires manufacturers and importers of explosive materials to submit samples of these materials as well as information on chemical composition or other information to the ATF when requested. This includes ammonium nitrate.

One of the three later SEA provisions effective May 24, 2003, requires intrastate users of explosives to obtain a "limited permit" from the ATF prior to receiving explosives. This type of

users may include farmers or construction companies that acquire and use explosives infrequently within their own state of residence. This limited permit allows the purchaser to receive explosive materials on no more than six occasions during the one-year period of the permit. This limited permit does not authorize the permittee to transport or use explosives interstate.

Another later SEA provision requires information from employers of "Responsible Persons" for more thorough ATF background checks. "Responsible Persons" are required to submit to ATF identifying information, fingerprints, and photographs. Employees of licensees and permittees who will be possessing explosive materials must submit only identifying information. The ATF must issue "letters of clearance" for those responsible persons and possessor employees who are not prohibited from possessing explosives. This new provision requires a background check be conducted by ATF for all persons possessing explosive materials in intrastate or interstate commerce.

Under these later provisions of SEA, ATF will have to physically inspect all ATF licensees and permittees at least once every three calendar years for compliance with Federal explosives storage regulations.

Who Can Dispose of Explosives?

Who can dispose of explosives? What documentation and clearances are required for an individual or company to remove and destroy explosives legally?

According to the SEA, a person can handle explosives if they are not a "prohibited person" and if they have the proper license and permit. A "prohibited person" is someone who: (1) is under indictment for, or has been convicted of, a felony; (2) is a fugitive from justice; (3) is an unlawful user of, or addicted to, any controlled substance (as defined in the federal Controlled Substances Act); (4) has been adjudicated as mentally defective or committed to a mental institution; (5) is an alien (with certain exceptions); (6) is a person dishonorably discharged from the armed forces of the United States; or (7) is a person who has renounced their U.S. citizenship.

If the person is not a "prohibited person" they can handle explosives provided they and their employer have all of the ATF permits or licenses required for all explosives users. One of these permits is the ATF user permit. This permit requires the employer of a person "authorized to possess explosive materials" or "responsible" for the use and management of explosive materials to provide: (1) identifying information for all employees "authorized to possess explosive materials"; and (2) identifying information, plus fingerprints and photographs for each "responsible person." Then the ATF has to conduct background checks to ensure that all employees and persons so identified are not "prohibited persons." Application forms for an explosives license or permit, and an employee possessor questionnaire can be found at the ATF web site (ATF, 2006).

Example: Explosives on Active Claim in the San Rafael Inventory. The UAMRP discovered a suspect box of dynamite in a mine opening in a remote and difficult to access area during

inventory. The UAMRP notified the BLM who notified the Sheriff's office who contacted the UAMRP. The BLM notified the claimant who then also contacted the UAMRP. The claimant did not have an active mine plan on file with the BLM. The claimant wanted the explosives and agreed to remove them from the mine. Because of the changes in the law since September 11, 2001, the claimant did not possess the required clearances or permits to handle or dispose of explosives. The Sheriff visited the site and confirmed the location information with the UAMRP. The BLM, Sheriff, and an explosives expert later returned and disposed of the materials by burning them on site. The time frame from initial notification to actual disposal of explosives (nearly one full box of dynamite with detonating cord on top of box) was 45 days.

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What are your duties/responsibilities once you have found explosives at an abandoned mine site? What could happen if you do not complete those duties? After notifiying authorities does your duty legally end? Does the AMRP retain some legal responsibility until the explosives are destroyed? Is there a minimum timeframe from discovery to notification? Is there a maximum timeframe from notification to disposal/destruction of the explosives?¶
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Case law & court decisions - research¶

Other Permits Required for Disposal of Explosives in Utah

In addition to satisfying the SEA, the land managing agency, local law enforcement, and ATF requirements, a Utah Hazardous Waste Emergency Treatment Permit from the State Department of Environmental Quality, Division of Solid and Hazardous Waste was required to dispose of the explosives by open burning onsite. Additional permits may be required from the appropriate land managing agency depending on each situation.

How Does Your Protocol Work?

If you do not currently have a protocol for dealing with abandoned explosives at abandoned mine sites you probably should develop one. One injury from abandoned explosives is enough to warrant some preventative training and advance preparation.

Tacoma Mine – The Rest of the Story

The Tacoma Mine explosives were first known to the Box Elder County Sheriff's office in 2001 prior to the underground survey work by the DWR biologist. In 2001 three boxes of dynamite were found in the underground powder magazine. The Sheriff filed a report for this discovery and notified the other officers who patrol that area. The case file then went dormant. The remoteness of the mine opening in the Pilot Mountains and questionable state jurisdiction (in Utah or in Nevada) may have been reasons for assigning this incident a low priority (see Figure 1, Tacoma Mine Location).

Four years later in September of 2005 the DWR biologist contacted the Box Elder County Sheriff's office about some sweaty dynamite in the Tacoma Mine (also spelled as Tecoma to match a Nevada railroad siding). The dynamite was in a small room (powder magazine) about 300 feet inside the mine. The magazine was located off the main adit with a partially open wooden door. There were an estimated 18 sticks of dynamite on a wooden bench. The dynamite was decomposing and the packing was deteriorating. The biologists did not have to pass through the magazine, but they walked in the main adit past the open door numerous times during their study.

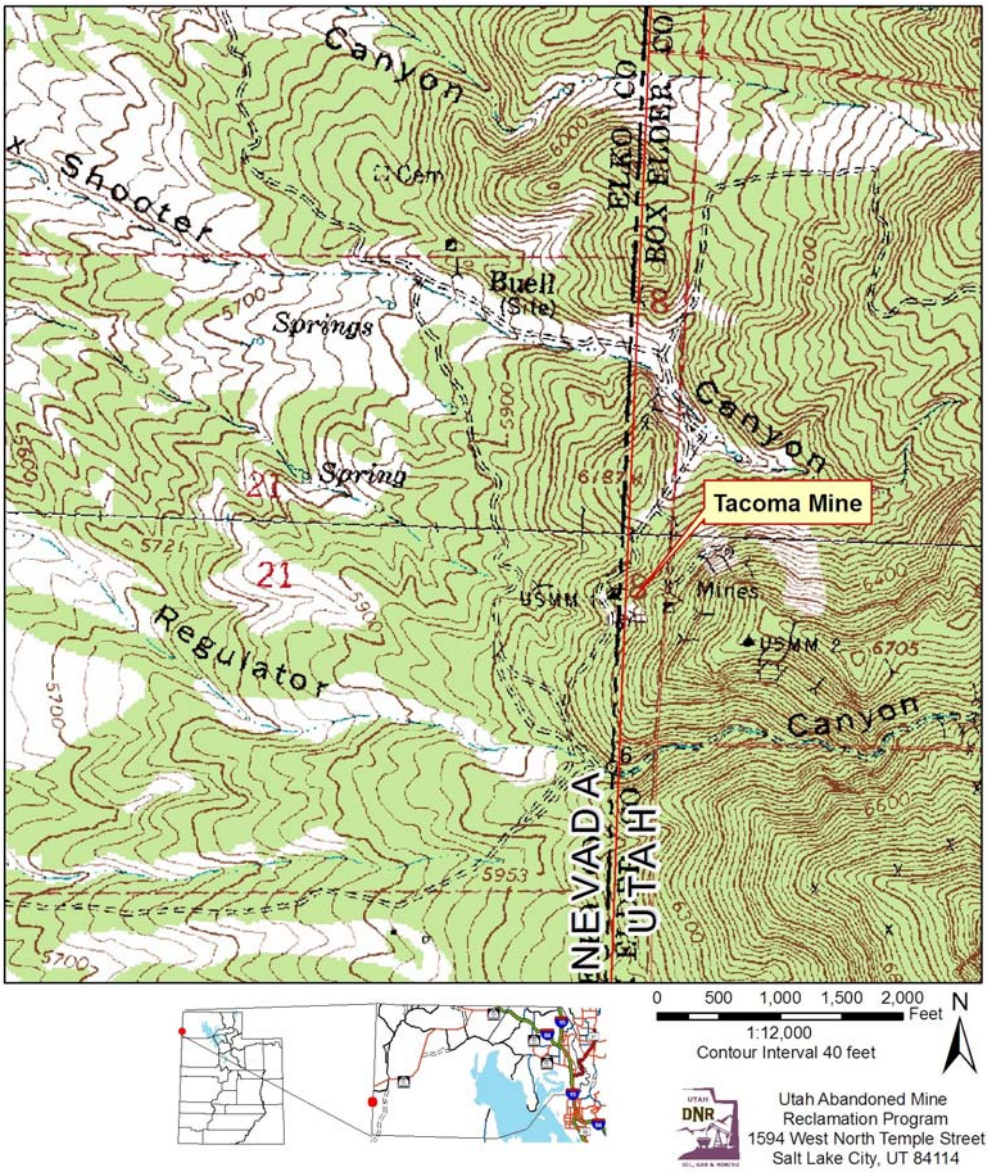

Figure 1. Tacoma Mine Location.

The DWR biologist contacted the UAMRP to ask for guidance when dealing with explosive materials in mines. He was given the contact information for the Tooele Army Depot EOD team, and also given a copy of the explosive and safety protocols for underground surveys. Additional information was exchanged regarding the mines location, responsibilities by claimants, and mine regulations that may be applicable. The biologist had spoken with the Hill

Air Force Base EOD who expressed interest in using this as a future training exercise. The DWR tried to contact the mine claimant based on information from the County Recorder and BLM claim listing, but there was no response.

Because of the on-going biological study and large population of Townsend's big-eared bats (see Appendix A) the Division of Wildlife Resources requested that the Sheriff allow them to assume responsibility for disposal of the explosives at a time that would minimize any harmful effects to the bat population in the mine. This bat is listed as a state sensitive species in Utah, which means there is credible scientific evidence to substantiate a threat to continued population viability (Utah, 2006). It is hoped that identifying such species and implementing appropriate conservation actions will preclude the need to list these species under the federal Endangered Species Act. The Sheriff agreed to allow DWR to coordinate the disposal. In that same month, an article titled "Utah Mines Filled with Explosives and Bats" came out in one of the local papers. Both the DWR biologist and the UAMRP Administrator were interviewed for the article. The article described the ongoing bat study at the Tacoma Mine and the hazardous situations in general in underground mines.

Based on information from several agency contacts, the biologist believed the only safe way to dispose of the explosives would be to burn the materials in place. Based on this, their general disposal plan was to wait until the bat population in the mine decreased as part of the natural pattern in the early spring and then burn the explosives in place. Timing the burn to this period of lesser bat activity would minimize the affects to the population. This was the DWR plan until March of 2006 when the UAMRP learned that the explosives had not been destroyed back in September of 2005.

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Given the unstable nature of the materials and the potential for a serious accident, it seemed appropriate to initiate a disposal action. The bat population was beginning to decrease as the temperatures increased, and the mine opening located at 6,000 feet in elevation would be more accessible as the snow receded.

The UAMRP contacted explosives expert Mickey Bradley, of Bradley Safety Consultants to ask for his advice on the situation. It turned out that Mr. Bradley was going to be in Utah for a blasters certification training in the coal mine region. He could arrange his schedule to have one free day in Salt Lake City before he had to fly back. He agreed to go to the Tacoma Mine and evaluate the situation and either remove the explosives from the mine or burn them in place, which ever he felt appropriate. The possibility of being able to safely remove the explosives without burning them inside the mine was an attractive option for the biologist and the ongoing study, so all parties agreed to Mr. Bradley's plan.

Mr. Bradley provided a shopping list of materials he would need to remove and/or burn the materials in place. The materials were: five gallons of diesel fuel, three five-gallon buckets, a stack of newspapers approximately one foot thick, one bale of hay, a lighter or torch, and a pry bar or claw hammer to dismantle the table in the powder magazine if needed. The UAMRP would provide transportation for Mr. Bradley to and from the Tacoma mine. The DWR would provide the materials he requested. The plan was to meet the DWR biologists and Sheriff at Montello, Nevada, and drive to the mine just inside the Utah border.

The mine is accessible by a four-wheel drive road; however, on March 24, 2006, the upper sections of this road were still covered by snow. The DWR staff brought three ATV's for just such a situation. The ATV's were used to haul the materials while the rest of the crew made a short hike up to the mine. The main biologist, sheriff, and UAMRP geologist accompanied the explosives expert, Mickey Bradley, into the mine to show him the location of the powder magazine. While in the mine, a brief evaluation of the present bat population was made (see Figure 2). While examining the magazine, it was found that the nitroglycerine crystals readily visible under the bluish light of an LED headlamp. The crystals were visible on the dynamite sticks, the wooden shelf, and behind the shelf on the wall.

Figure 2. Townsend's big-eared bats in Tacoma Mine.

After examining the magazine and explosives, Mr. Bradley decided he could safely remove the old dynamite from the magazine and burn the materials outside. He described his process, and where he wanted the rest of the crew to wait while he made the several trips required to remove all the materials. The crew was to construct a bed of newspaper covered with a layer of straw at a safe location for burning. Mr. Bradley placed twelve sticks of dynamite from the magazine into the plastic buckets containing diesel fuel approximately three inches deep. He then walked out of the mine carrying the buckets. He made two trips to remove the

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dynamite. On the third trip he removed the saturated portion of the wooden bench that revealed one more hidden stick of dynamite. The sticks of dynamite were placed on the newspaper and straw burn bed several inches apart with the remaining diesel fuel in the buckets poured on them. All the dynamite and the piece of wood bench burned successfully without detonation. All together 25 sticks of Hercules, Extra Strength dynamite were burned. One stick had a date code of 1965 still visible.

As a result of this disposal outside of the mine there were no adverse effects to the present bat population. The short time of increased visitation during this disposal was thought to have a very minimal effect on the bat population due to the location of the human activity and the small number of bats present on this day. The biological study can now continue as planned without the added hazard of the abandoned explosives in the mine.

With proper preparation and knowledge, it is possible that all encounters with explosives have an ending such as this. Plan ahead and prepare a safety protocol. A safe outcome is no accident.

Acknowledgements

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Mark Mesch, Program Administrator, UAMRP.

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APPENDIX A

Biological Study of Bats at the Tacoma Mine

Adam Kozlwoski, Utah Division of Wildlife Resources

Townsend big-eared bats are listed as state sensitive in Utah and the majority of the western states that they are found in. Townsend's rely almost exclusively on caves and mines to provide year-round roost habitat. In particular, Townsend's gather in large numbers in the summer to raise young and the winter to mate and hibernate. During these times of year, Townsend's specific habitat requirements limit the number of suitable roosts, thereby concentrating the population to just a few localities. Although direct population enumeration is greatly facilitated during these life history stages, historically survey efforts are greatly limited during these periods in an effort to reduce disturbance. Although responses to summer disturbances are well documented, winter disturbances rates have not been empirically demonstrated. Although spending much of their time in torpor, the winter months are also when Townsend's are periodically active to mate. Very little is known about the background movement rates of Townsend's big-eared bats during winter and to what extent non-tactile disturbances affect their behavior. The goal of the study being conducted by the UDWR is to provide empirical evidence to support or refute current dogma regarding the sensitivity to bats to periodic winter visitation. Preliminary evidence indicates that the effects of a survey team on the movement and arousal of hibernating Townsend's was not significantly greater than background movement. Results of the study could be used to help reinstate long-term survey efforts and population counts necessary to track population trends in association with quantity and quality of surrounding foraging habitat.

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